EurotestCOMBO

MI 3125 BT

Short instruction manual

Version 2.2, Code no. 20 751 578

METREL®

Distributor:

Manufacturer:

METREL d.d.
Ljubljanska cesta 77
1354 Horjul
Slovenia
web site: http://www.metrel.si
e-mail: metrel@metrel.si

CE Mark on your equipment certifies that this equipment meets the requirements of the EU (European Union) concerning safety and electromagnetic compatibility regulations

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1 Start-up guide

1.1 Safety and operational considerations

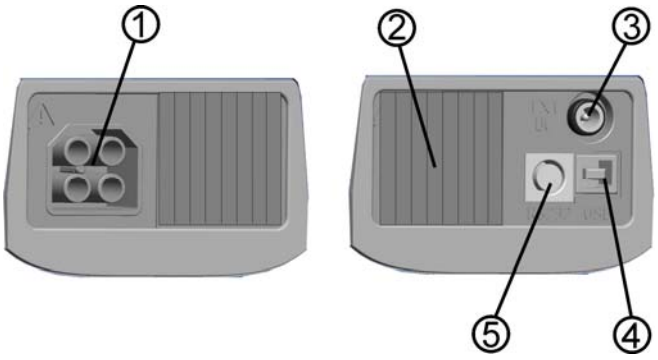
Warnings

- This document is not a supplement to the Instruction manual!
- The ⚠ symbol on the instrument means »Read the Instruction manual with special care for safe operation«. The symbol requires an action!
- If the test equipment is used in a manner not specified in this user manual, the protection provided by the equipment could be impaired!
- Read this user manual carefully, otherwise the use of the instrument may be dangerous for the operator, the instrument or for the equipment under test!
- Do not use the instrument or any of the accessories if any damage is noticed!
- If a fuse blows in the instrument, follow the instructions in this manual in order to replace it!
- Consider all generally known precautions in order to avoid risk of electric shock while dealing with hazardous voltages!
- Do not use the instrument in supply systems with voltages higher than 550 V!
- Service intervention or adjustment is only allowed to be carried out by a competent authorized personnel!
- Use only standard or optional test accessories supplied by your distributor!
- Consider that protection category of some accessories is lower than of the instrument. Test tips and Tip commander have removable caps. If they are removed the protection falls to CAT II. Check markings on accessories!
  (cap off, 18 mm tip)…CAT II up to 1000 V
  (cap on, 4 mm tip)… CAT II 1000 V / CAT III 600 V / CAT IV 300 V
- The instrument comes supplied with rechargeable Ni-Cd or Ni-MH battery cells. The cells should only be replaced with the same type as defined on the battery compartment label or as described in this manual. Do not use standard alkaline battery cells while the power supply adapter is connected, otherwise they may explode!
- Hazardous voltages exist inside the instrument. Disconnect all test leads, remove the power supply cable and switch off the instrument before removing the battery compartment cover.
- All normal safety precautions must be taken in order to avoid risk of electric shock while working on electrical installations!

1.2 Instrument description - Front and connector panel

Instrument description

1. Display
2. TEST button
3. Arrow key
4. Arrow key
5. MEM button
6. Function Selector
7. Backlight button
8. On/off button
9. HELP (to enter help screens), CAL button
10. TAB button (for changing test parameters)
11. Pass indicator
12. Fail indicator



Connectors

1. Test lead socket
2. Cover
3. Charger socket
4. USB connector
5. RS232 (serial) connector

1.3 Instrument description - Meaning of symbols

The online voltage and output terminal monitor

	Online voltage is displayed together with test terminal indication. All three test terminals are used for selected measurement.
	Online voltage is displayed together with test terminal indication. L and N test terminals are used for selected measurement.
	L and PE are active test terminals; N terminal should also be connected for correct input voltage condition.
	L – N polarity changed.
	Test leads resistance in Continuity measurement is not compensated.
	Test leads resistance in Continuity measurement is compensated.

Message field – battery status

	Battery capacity indication.
	Low battery. Battery is too weak to guarantee correct result. Replace or recharge the battery cells.
	Recharging in progress (if power supply adapter is connected).

Message field – measurement warnings/messages

	Warning! High voltage is applied to the test terminals.
	Warning! Phase voltage on the PE terminal! Stop all the measurements immediately and eliminate the fault before proceeding with any activity!
	Measurement is running. Consider any displayed warnings!
	Measurement can be performed after pressing the TEST key. Consider any displayed warning after starting the measurement!
	Measurement prohibited. Consider any displayed warnings and check online voltage/terminal monitor!
	Result(s) can be stored.
	High electrical noise was detected during measurement. Results may be impaired.
	RCD tripped during the measurement. The trip limit may be exceeded as a result of leakage current flowing to the PE protective conductor or capacitive connection between L and PE conductors.
	Instrument overheated. Temperature of internal components in the instrument reached top limit. Measurement is prohibited until the temperature is lower then that limit.
	High resistance to earth of test probes. Results may be impaired
	Fuse F1 is broken.

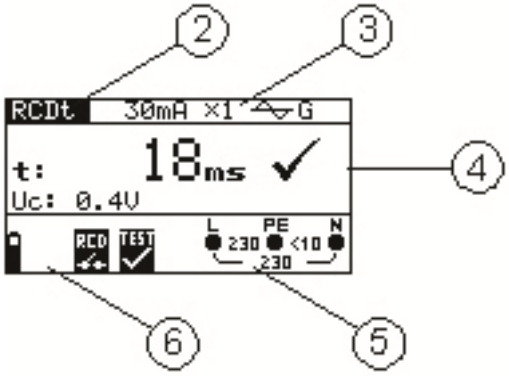
Result field

	Measurement result is inside pre-set limits (PASS).
	Measurement result is out of pre-set limits (FAIL).
	Measurement is aborted. Consider displayed warnings and messages.

Sound warnings

Continuous sound	Warning! Dangerous voltage on the PE terminal is detected.

1.4 Function selector switch and instrument display



Legend:

1. Function switch.
2. Function or sub-function name.
3. Measuring parameters and limit values.
4. Result field.
   In this field the main and sub-results together with the PASS/FAIL/ABORT status are displayed.
5. Online voltage and output monitor.
6. Message field.
   In this field battery status and warnings/messages related to the actual measurement are displayed.

1.5 Battery handling

- When replacing battery cells or before opening battery/fuse compartment cover, disconnect any test leads/accessory connected to the instrument and switch off the instrument. Hazardous voltage can exist inside the instrument!
- Insert all cells correctly! If this is not performed correctly, the instrument will not operate and the battery could be discharged.
- If the instrument is not used for a long period of time, remove all of the battery from the battery compartment to protect the instrument from leakage.
- Alkaline or rechargeable Ni-MH battery cells (size AA) can be used. The operating hours are given for cells with a nominal capacity of 2100 mAh.

Do not recharge alkaline battery cells. The battery will begin charging as soon as the power supply adapter is connected to the instrument. The in-built protection circuits control the charging procedure.

Power supply socket polarity

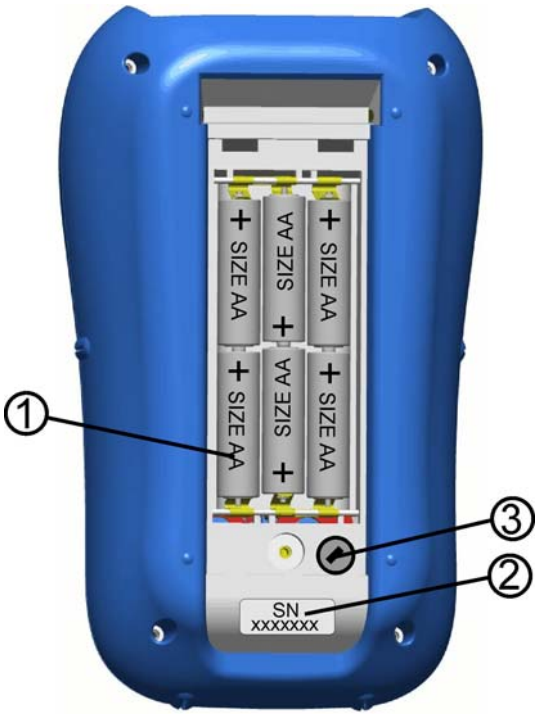
Note:
Only use the power supply adapter delivered from manufacturer or distributor of the test equipment to avoid possible fire or electric shock!

1.6 Maintenance

1.6.1 Replacing fuses

Fuse
M 0.315 A / 250 V, 20 x 5 mm
This fuse protects internal circuitry of low-value resistance function if test probes are connected to the mains supply voltage by mistake.

Warnings:
- Disconnect any test leads/accessories from the instrument and switch off the instrument before opening battery/fuse compartment cover. Hazardous voltage can exist inside the instrument!
- In case a fuse has blown in the instrument, follow the instructions in instruction manual to replace it!
- Replace any blown fuses with exactly the same type of fuse. Inserting the wrong fuse into the instrument can impair the operator's safety and/or damage the instrument.



1.7 Warranty & Repairs

Metrel UK's instruments have a two years warranty against defects in materials or workmanship. Accessories and other supplementary products have a one year warranty against defects in material or workmanship.
Any potentially defective items should be returned to Metrel accompanied by information regarding the faults that was incurred. It is recommended that any defective equipment is sent back to Metrel via the wholesaler from which the product was purchased.
All defective products will be replaced or repaired within policy period. For these items, a full refund will only be issued if a sufficient replacement is not available. Any shipping / return-shipping costs are not refundable.
Metrel UK shall not be held liable for any loss or damage resulting from the use or performance of the products. In no event shall Metrel UK be liable to the customer or its customers for any special, indirect, incidental, exemplary or punitive damages resulting from loss of use, interruption of business or loss of profits, even if Metrel UK has been advised of the possibility of such damages.
If the customer's unit is out of warranty but needs repairs a quote for repair will be provided via the wholesaler through which the instrument was sent in.

Notes

- Any unauthorized repair or calibration of the instrument will infringe the product's warranty.
- All sales are subject to Metrel UK's Standard Terms and Conditions, a full copy of which is available Metrel UK's office. Metrel UK reserves the right to change the conditions at any time. Any typographical, clerical or other error or omission in any sales literature, quotation, price list, acceptance of offer, invoice or other documentation or information issued by Metrel UK shall be subject to correction without any liability on the part of the customer.
- Specifications and designs of goods are subject to change by Metrel UK at any time without notice to the customer. Metrel UK reserves the right to make any changes in the specification of goods which are required to conform with any applicable statutory or EC requirements or, where goods are to be supplied to Metrel UK's specification, which do not materially affect their quality or performance.
- If a condition was found to be invalid or void it would not affect the overall validity of the remainder of the conditions;
- Metrel UK are excluded from liability for any delays or failure to comply, where the reason is beyond Metrel UK's control;
- No order which has been accepted by Metrel UK may be cancelled by the customer except with the agreement in writing of Metrel UK and on terms that the customer shall indemnify Metrel UK in full against all loss (including loss of profit), costs (including the cost of all labour and materials used), damages, charges and expenses incurred by Metrel UK as a result of cancellation. The minimum charge for such cancellation will be 25 % of the total value of the goods ordered.

1.8 Contact Metrel UK

Metrel UK
Unit 1, Hopton House, Ripley Drive
Normanton Industrial Estate
Normanton,
West Yorkshire
WF6 1QT

Tel.:+44/ (0) 1924 24 50 00
Fax: +44/ (0) 1924 24 50 07
E-mail: info@metrel.co.uk
Web: www.metrel.co.uk

Update your meter
Metrel offers a service of updating your software of firmware to the latest developments. Register on www.metrel.co.uk to receive updates of PC SW and firmware of the meters.

Calibrate your Meter
Metrel offers a calibration service of all Metrel equipment. Contact Metrel UK on 01924 245000 and ask for the calibrations department.

Repair
Metrel offers a repair service of all Metrel equipment. Contact Metrel UK on 01924 245000 and ask for the repairs department.

Ask a technical question
Metrel offers a Technical Advice Line every Mon-Thu from 8:00 a.m. till 5.00 p.m. and Fridays from 8:00 a.m. till 4 p.m.

Get training on Metrel meters
Metrel offers training on site or at the office subject to a charge.

2 Quick-test guide

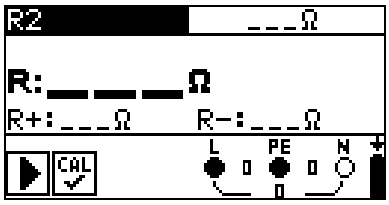
2.1 Null the leads

Starting the tester:

1. Insert the fully charged batteries
2. Press the On/Off button
3. Connect test cable to the instrument.

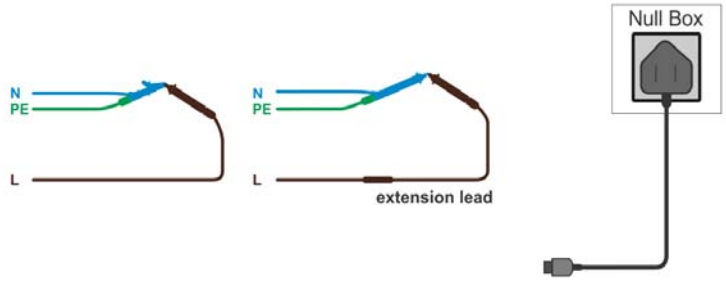
① Step

- Select Continuity function with the function selector switch first. The following menu is displayed:



② Step

- Short test leads first as shown.

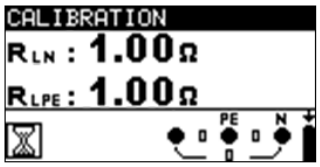


③ Step

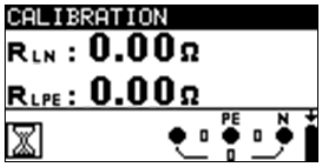
- Press the TEST key in order to perform regular measurement. Result close to 0.00 Ω is displayed..

④ Step

- Press the CAL key. After performing test leads compensation first measured value and then 0.00 Ω is displayed. If calibration was carried out successfully leads indicator CAL is shown in the Continuity function.



Measured value to be calibrated.



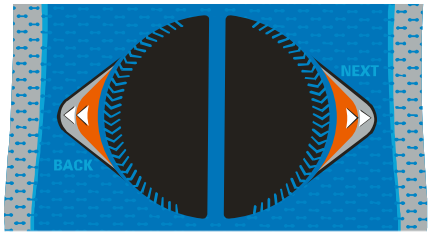
Reading at calibrated value is 0.00 Ω now.

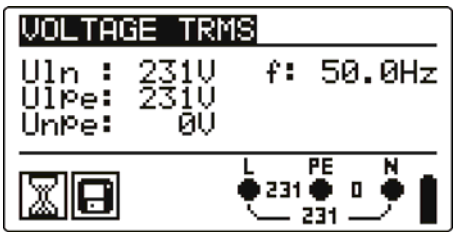
2.2 Measurements

2.2.1 Online Voltage and frequency / Phase sequence - AC Voltage measurement and frequency measurements, phase sequence

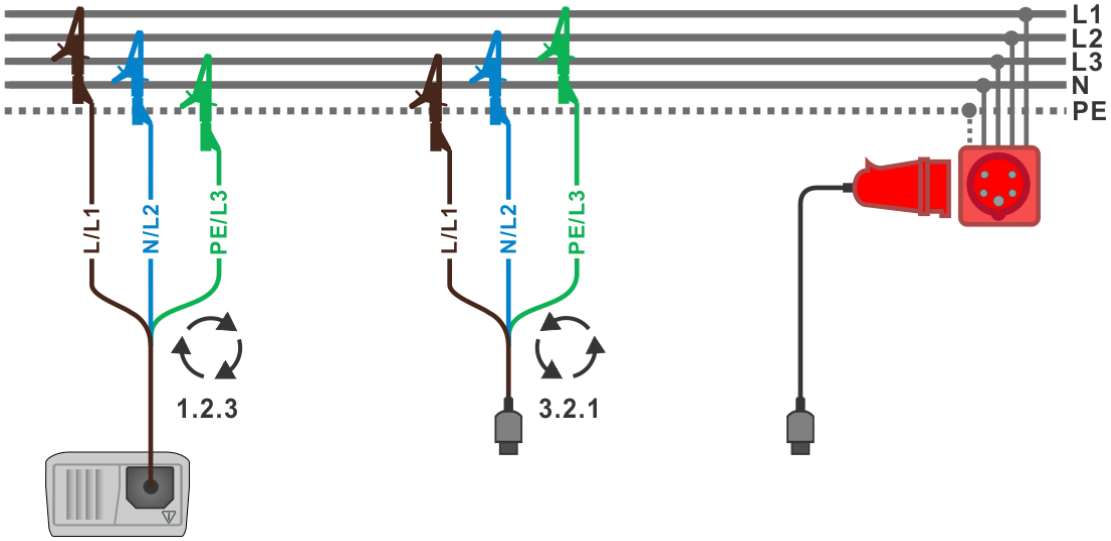
- Monitors voltages between L-N, L-PE and N-PE at the same time
- Values shown in real-time
- System can also be used on 3 phase systems for monitoring voltages between phases
- Phase sequencing should be checked on 3 phase systems.
- System shows values e.g. 1,2,3 or 3,2,1 which relate to the green, blue and brown test leads to show rotation

① Set function

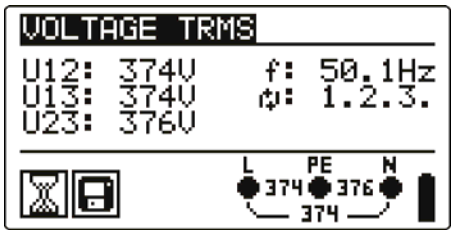


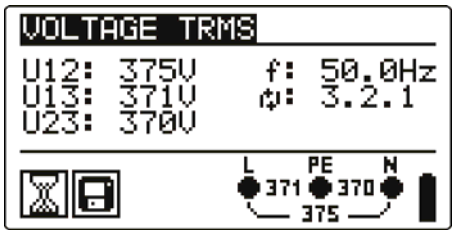


② Connection diagram



③ View results



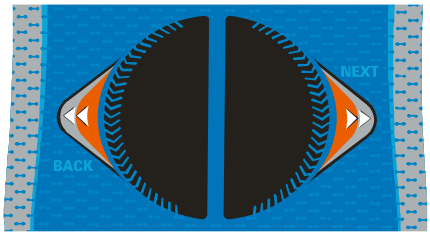


Displayed results:

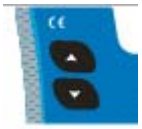
- Ul(1)-n(2): Voltage between phase and neutral conductors (or between phases L1 and L2)
- Ul(1)-pe(3): Voltage between phase and protective conductors (or between phases L1 and L3)
- Un(2)-pe(3): Voltage between neutral and protective conductors (or between phases L2 and L3)
- 1.2.3: Correct connection – CW rotation sequence,
- 3.2.1: Invalid connection – CCW rotation sequence,
- f: frequency

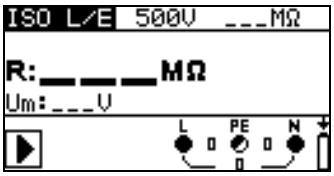
2.2.2 Insulation resistance - For testing the MΩ value of the insulation between wires

① Set function



② Set subfunction

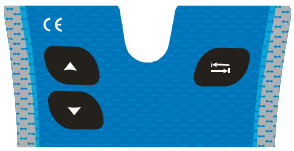




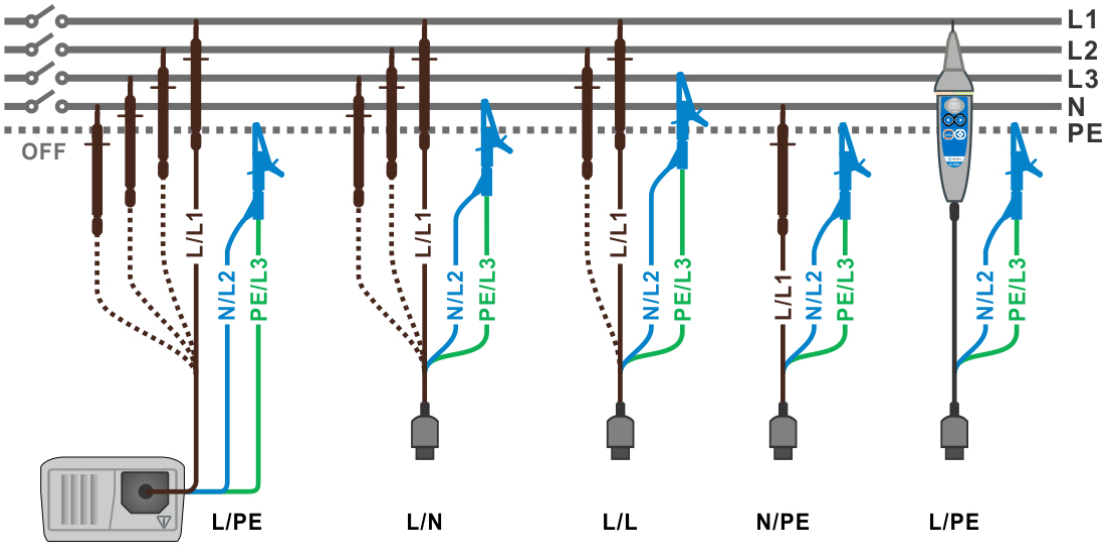
- ISO N/E
- ISO L/E
- ISO L/N
- ISO L/L

③ Set parameters and limits

- Nominal test voltage (50 VDC ÷ 1000 VDC)
- Low limit resistance Ω sets limit off, 0.01 MΩ ÷ 200 MΩ



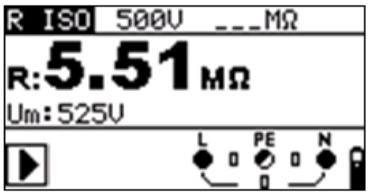
④ Connection diagram



⑤ **Press and hold the TEST key until result has stabilised.**

- All tests are performed between the L1 and L2 test leads.

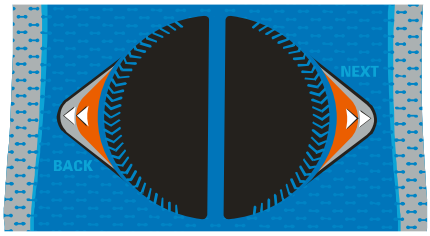
⑥ **View results**



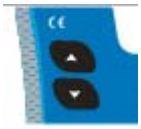
Displayed results:
R: Insulation resistance
Um: Instrument test voltage

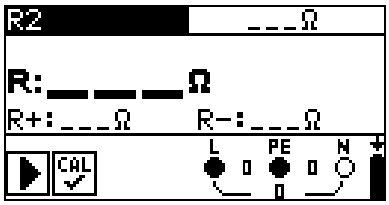
2.2.3 Continuity for testing resistance of earth conductors and equipotential bonding

① Set function



② Set subfunction

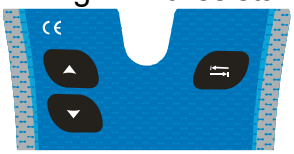




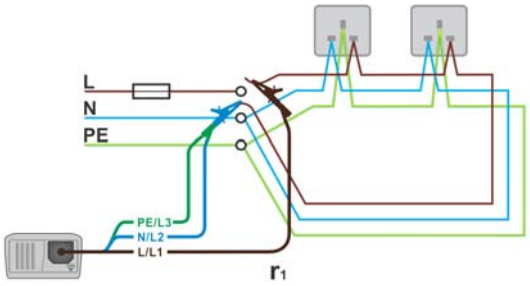
- r_1,
- r_N
- r_2
- R_1+R_2
- R_2
- R_1+R_N

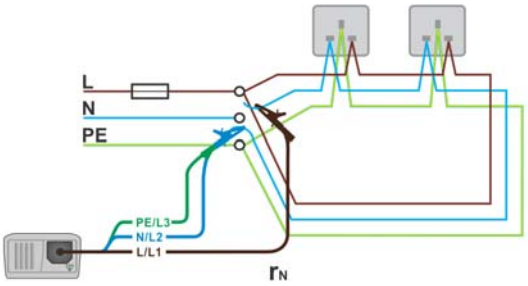
③ Set parameters and limits

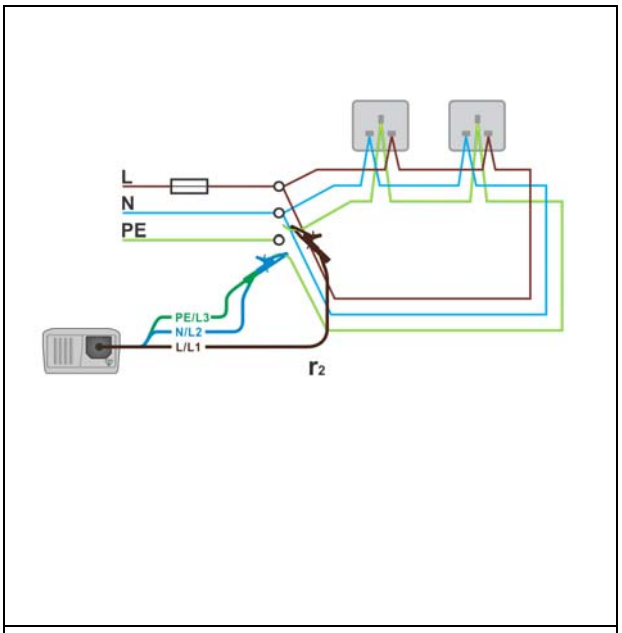
- High limit resistance Ω sets limit off, 0.1 Ω ÷ 20.0 Ω]

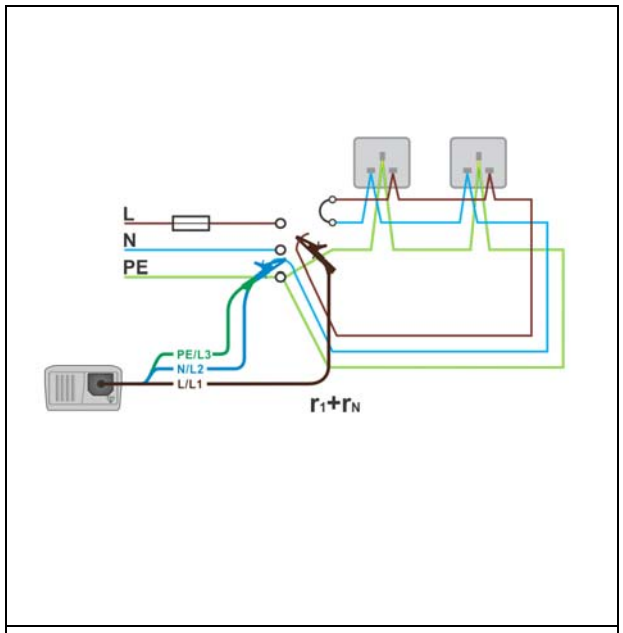


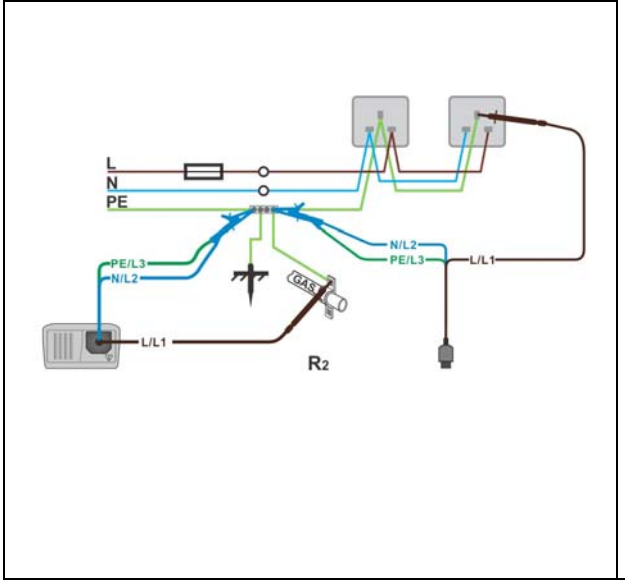
④ Connection diagrams

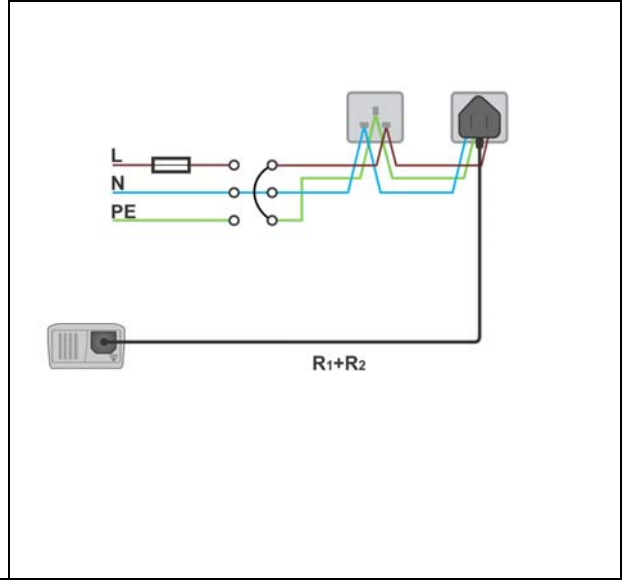








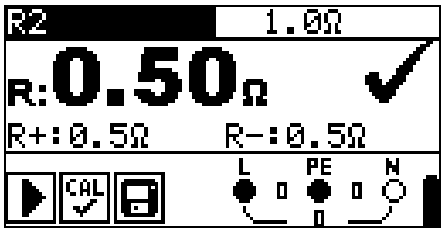




⑤ **Press the** TEST **key.**

⑥ **View results**

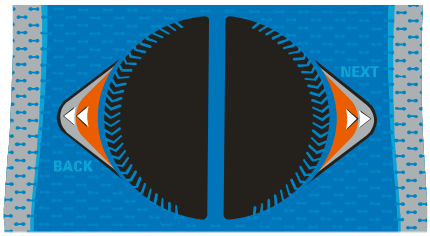
Displayed results:
R: R2 resistance result
R+: Result at positive polarity
R-: Result at negative test polarity



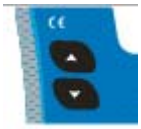
2.2.4 Ring Continuity

- With Easy Switch A1214 the resistance measurements in final ring circuits can be simplified.
-

① Set function

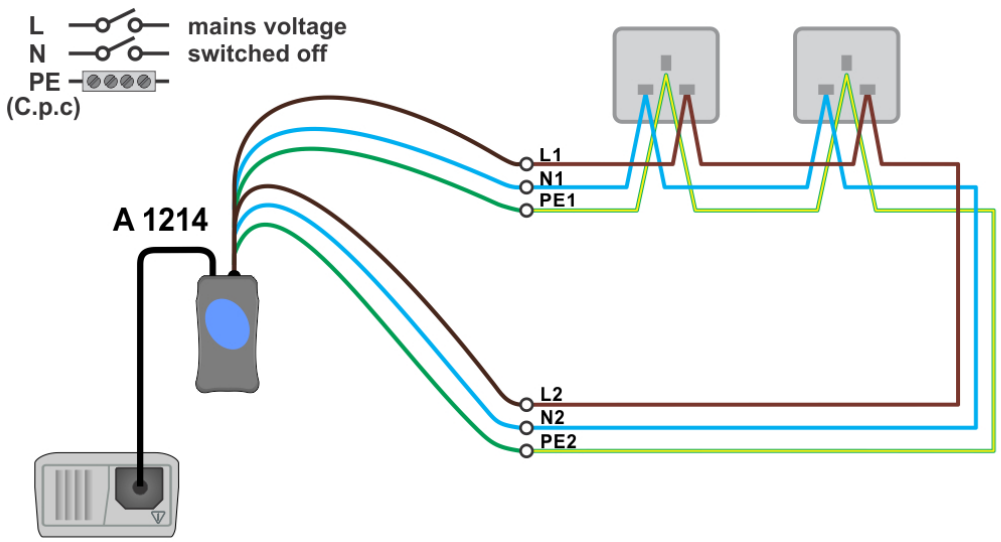


② Set subfunction



- r1,r2, rN
- R1+R2, R1+RN

③ Connection diagrams for measurement of r1, r2, rN

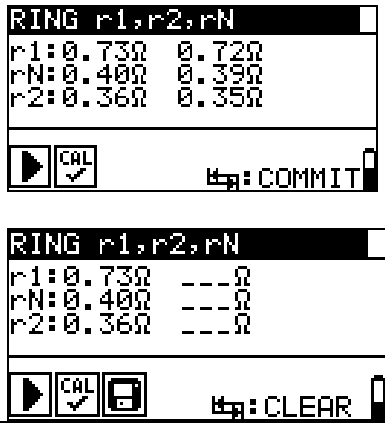


④ Press the TEST key.

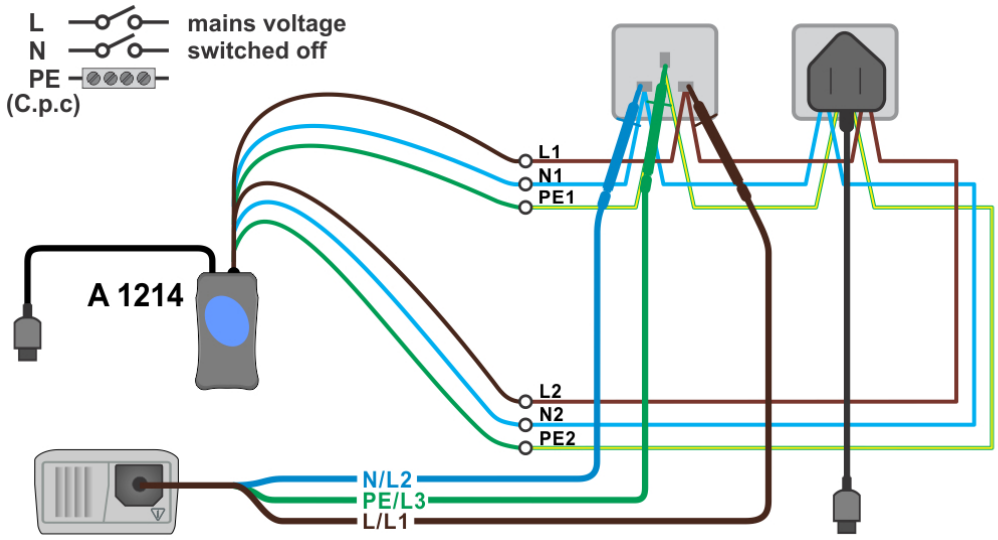
- Commit results to r1,r2, rN with **TAB** key.
- Before measurement results can be cleared with **TAB** key.

⑤ View results

Displayed results:
r1: Ring resistance of line conductors (committed and measured)
r2: Ring resistance of protective conductors (committed and measured)
rN: Ring resistance of neutral conductors (committed and measured)



③ Connection diagrams for measurement of R1+R2, R1+RN

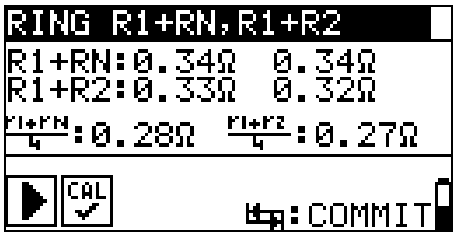


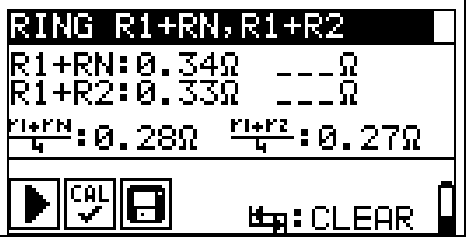
④ Press the TEST key.

- Commit results to R1+R2, R1+RN with **TAB** key.
- Before measurement results can be cleared with **TAB** key.

⑤ **View results**

Displayed results:
R1+RN: Reference test value, committed and measured
R1+R2: Reference test value, committed and measured
(r1+r2)/4: Calculated reference value
(r1+rN)/4: Calculated reference value





⑥ **Repeat measurement of R1+R2, R1+RN on other socket outlets and connection points in the final ring circuit.**

- Maximal results are to be considered.

2.2.5 RCD testing - 3 functions for testing RCDs.

Uc
- For testing contact voltage on exposed earthed conductive parts.

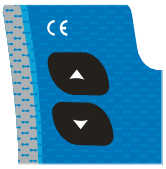
RCD t
- For testing the time it takes for an RCD to trip.
- Tripping currents can be multiplied by x1/2, x1, x2 and x5.

RCD I
- RCD ramp test.
- RCD ramp slowly increases the tripping current to find the minimum fault current required to trip an RCD.
- Useful in faultfinding nuisance RCD tripping.

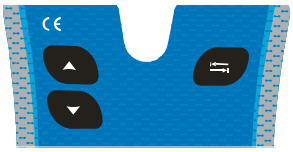
AUTO
- A automated test of the most important parameters associated with an RCD via one press of a button.
- If a faulty parameter is noticed during the autotest, the test will stop to highlight the need for further investigation.

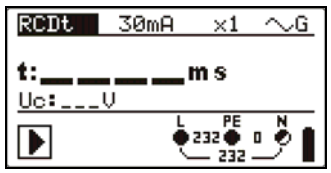
① Set function

② Set subfunction
- **Uc**
- **RCD t**
- **RCD I**
- **AUTO**



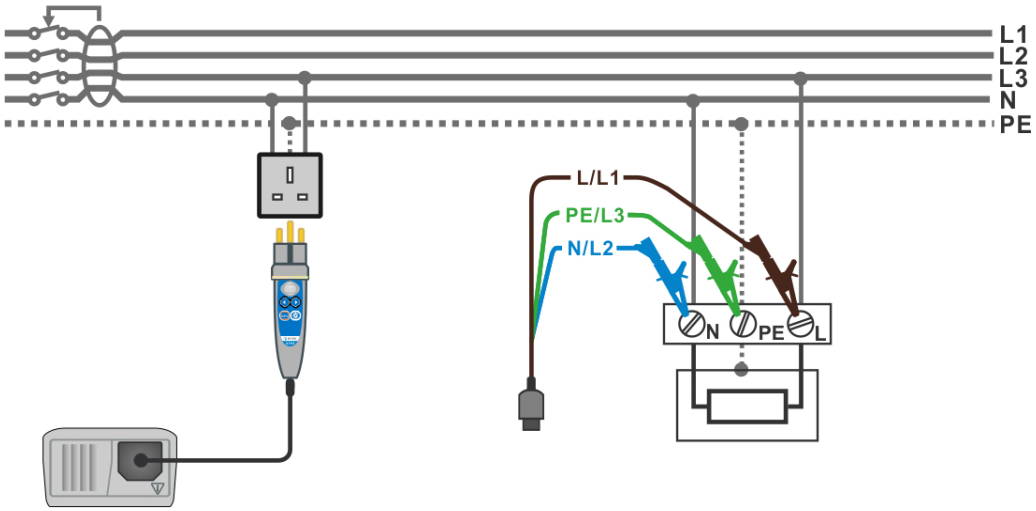
③ Set parameters and limits





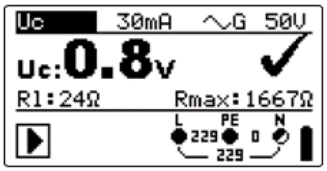
- Limit contact voltage (25 V, 50 V)
- Nominal differential RCD tripping current (10 mA ÷ 1000 mA)
- Multiplier of nominal differential RCD tripping current (x½, x1, x2, x5)
- RCD type [G, S], test current waveform plus starting polarity [~, ~, ~, ⌐, ⎓, ⎓].

④ Connection diagram

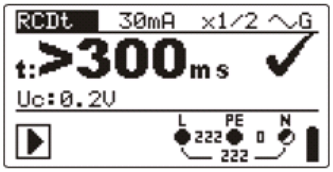


⑤ Press the TEST key

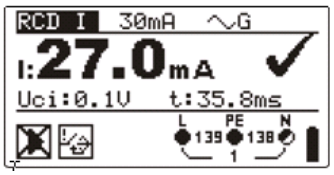
⑥ View results



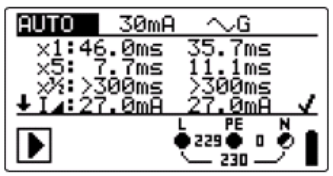
Displayed results:
Uc: Contact voltage
RL: Fault loop resistance
Rmax: High limit fault loop resistance



Displayed results:
t: Tripping time
Uc: Contact voltage



Displayed results:
IΔ: Tripping current
Uci: Contact voltage at IΔ
tI: Tripping time



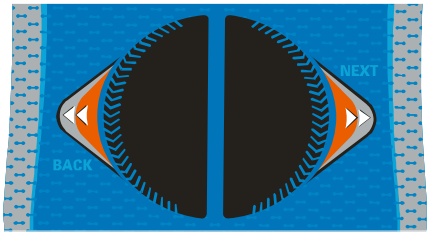
Displayed results:
Uc: Contact voltage
x1, x5, x½: Tripping times
I◢: Tripping current

2.2.6 Loop - Fault loop impedance

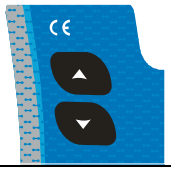
Zloop
- High current loop test.
- Very quick and efficient for testing non RCD protected circuits.

Zs rcd
- Low current loop test.
- Multitude of test performed over a longer period of time for increased accuracy.
- Guaranteed not to trip the RCD.

① Set function

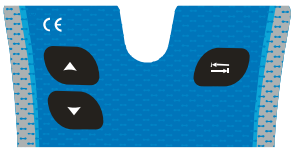


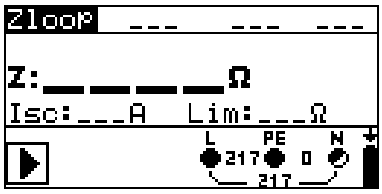
② Set subfunction
- **Zloop**
- **Zs rcd**



③ Set parameters and limits

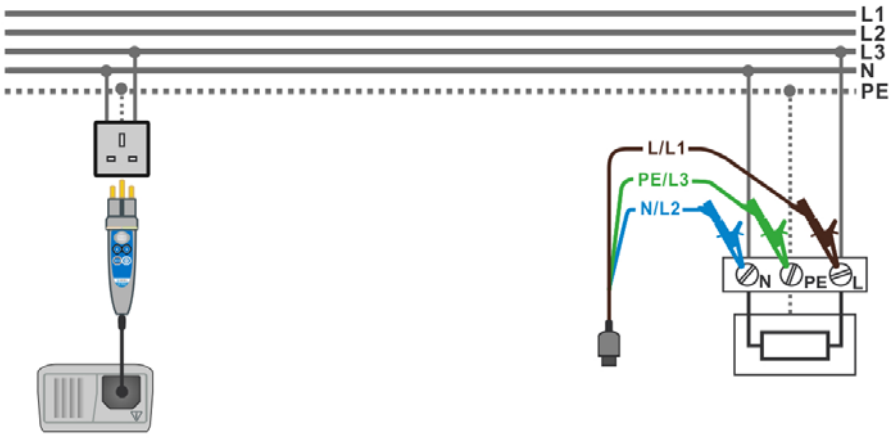
Zloop





- Fuse type (--- sets limit OFF, BS88-2, BS3036, BS88-3, BS1362, B, C, D)
- Fuse current rating (3 A ÷ 200 A)
- Fuse tripping time (0.4 s, 5 s)

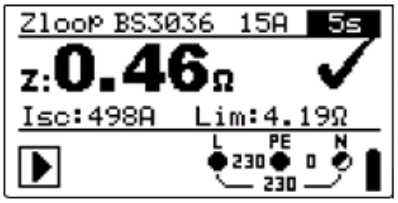
④ Connection diagram



⑤ **Press the** TEST **key**

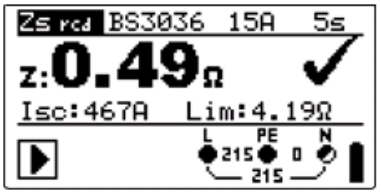
⑥ **View results**

Zloop



Displayed results:
Z: Fault loop impedance
Isc: Prospective fault current
Lim: High limit fault loop impedance value (if applicable)

Zs rcd



Displayed results:
Z: Fault loop impedance
Isc: Prospective fault current
Lim: High limit fault loop impedance value (if applicable)

2.2.7 Line impedance - (phase-neutral, phase-phase) / Voltage drop

Zline

- Used for testing between phases on a single or 3 phase system e.g. testing (L to N, L1 to L2, L2 to L3 etc).

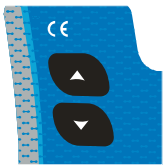
ΔU

- To check that a voltage in the installation stays above acceptable levels if the highest current is flowing in the circuit.

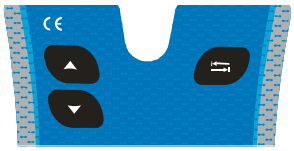
① Set function

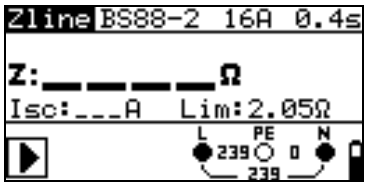
② Set subfunction

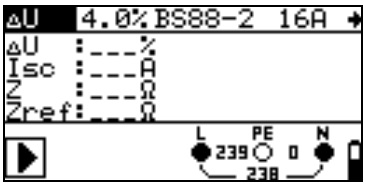
- **Zline**
- **ΔU**



③ Set parameters and limits





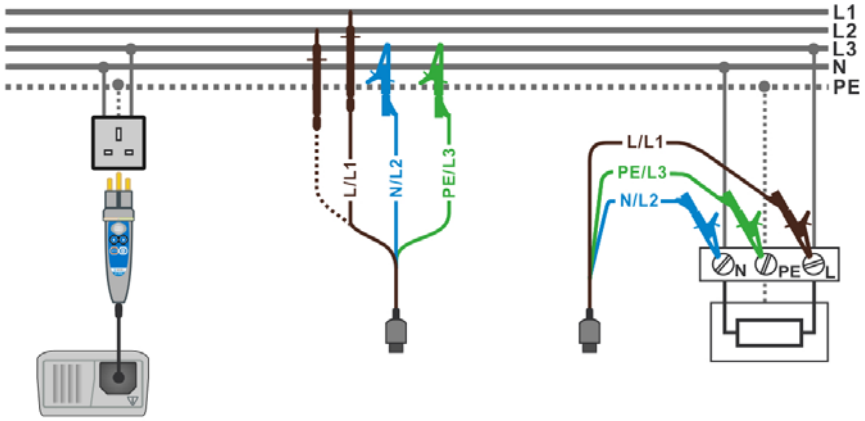


- Fuse type (--sets limit OFF, BS88-2, BS3036, BS88-3, BS1362, B, C, D)
- Fuse current rating (3 A ÷ 200 A)
- Fuse tripping time (0.4 s, 5 s)

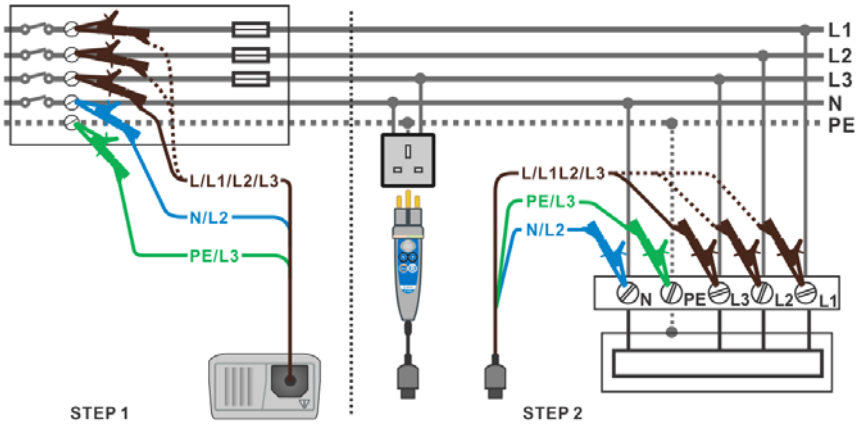
- ΔU_{MAX} - maximum voltage drop [3.0 % ÷ 9.0 %].

④ Connection diagram

Zline



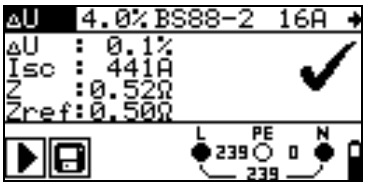
ΔU - Voltage drop



⑤ Press the TEST key

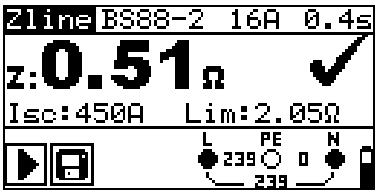
⑥ View results

ΔU



Displayed results:
ΔU….Voltage drop
Isc…..Prospective short-circuit current
Z……Line impedance at measured point
Zref…Reference impedance

Zline

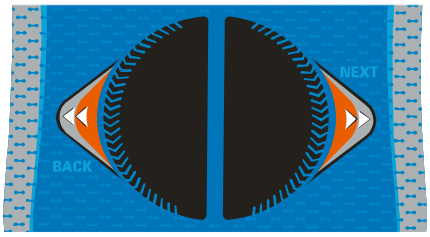


Displayed results:
Z: Line impedance
Isc: Prospective short-circuit current
Lim: High limit line impedance value (if applicable)

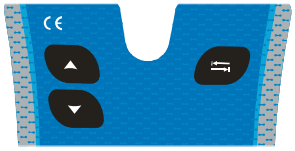
2.2.8 Earthing resistance

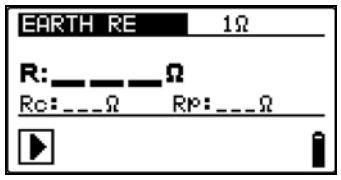
- Main earthing arrangements, lightning systems, local earthings, etc can be verified with the earthing resistance test.

① Set function



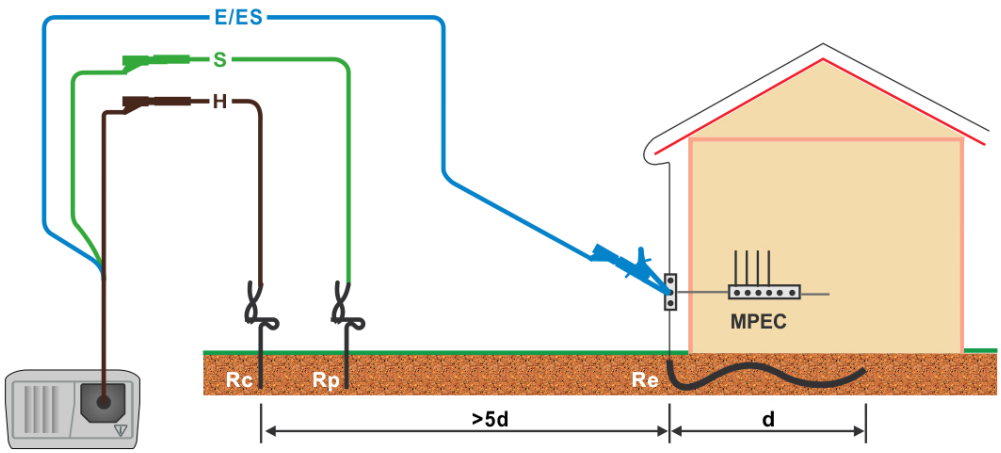
② Set parameters and limits





- High limit resistance Ω sets limit off, 1 Ω ÷ 5 kΩ

③ Connection diagram



④ Press the TEST key

⑤ View results

Displayed results:
R: Earth resistance,
Rp: Resistance of S (potential) probe,
Rc: Resistance of H (current) probe.